WHAT IS CLAIMED IS:

1.   A method of extracting data from a source document wherein words, portions of words and graphic elements are circumscribed by polygons hereinafter referred to as quads, comprising the steps of:

        oversizing each quad in a predetermined range of the document;

        selecting a first quad;

        a.   determining if said selected first quad intersects and thus overlaps a second quad:

                i. if overlap is detected, assigning said second quad to the selected first quad, thereby creating a total polygon area larger than either original entity; and

                ii. if overlap is not detected, creating an encompassing polygon including said selected first quad;

        b.   merging the newly created or enlarged polygon (of step "a") with any other polygon found to overlap with the step "a" polygon;

        repeating steps "a" and "b" for any further unassigned quads left in said predetermined range and not encompassed by a polygon;

        selecting a first frame of quads assigned to a polygon;

        c.   decomposing all graphical elements within the selected frame into straight lines;

        d.   assembling components of the selected frame into a table when examination of the decomposed frame indicates a predetermined arrangement of table cell defining straight lines; and

        repeating steps "c" and "d" for identifying any possible table in any remaining frames of assigned quads.

2.   The method of claim 1 wherein:

        step c includes retaining relative placement data of each decomposed line as obtained from the source document; and

        step d comprises the additional sub-steps of:

            combining co-aligned lines in the frame;

            creating a rectangular table boundary;

splitting any previously formed rectangle determined to be cut by any selected co-aligned line inserted into said rectangular table boundary to create at least two new rectangles; and

removing any created rectangle whose interior would not include at least one text

5   quad.

3.   A method of mining data from a visually displayable source document having quads defining textual and graphics elements, comprising the steps of:

combining quads, having less than a predetermined separation, into frames;

10   generating textual paragraphs, in an output document, from frames detected to contain only textual and textual associated symbols; and

generating tables, in said output document, from frames detected to contain only vertically and horizontally oriented straight lines enclosing textual and textual associated symbols.

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4.   A method of eliminating a group of quads in a source document, each quad of which is relatively situated within a predetermined distance of each other, as potentially defining a table of data, comprising the steps of:

decomposing all graphic elements in said group of quads into straight lines;

20   determining the orientation of each of said straight lines; and

eliminating said group of quads where any of said straight lines is oriented other than horizontal and vertical.

5.   A method of eliminating a group of quads in a source document, each quad of which is

25   relatively situated within a predetermined distance of each other, as potentially defining a table of data, comprising the steps of:

decomposing all graphic elements in said group of quads into straight lines;

combining any decomposed co-aligned lines into a new set of straight lines;

creating a rectangular table perimeter;

30   cutting said rectangular table perimeter into smaller rectangles using said straight lines whereby a plurality of cells are created;

removing rectangles not circumscribing a text quad of said group of quads;

eliminating said group of quads, as potentially defining a table, if any text quad is not circumscribed by a rectangular cell.

5   6.   A method of establishing that a group of quads in a source document, each of which is relatively situated within a predetermined distance of each other, potentially defines a table of data, comprising the steps of:

decomposing all graphic elements in said group of quads into straight lines; and

determining that the orientation of each of said straight lines is either horizontal or

10   vertical.

7.   The method of claim 6, comprising the additional steps of:

combining any decomposed co-aligned lines into a new set of straight lines;

creating a rectangular table perimeter;

15   cutting said rectangular table perimeter into smaller rectangles using said straight lines whereby a plurality of cells are created; and

eliminating said group of quads if any text quad is not circumscribed by a rectangular cell.

20   8.   A method of recreating a table in a destination document from a visual display file using quads to encompass textual and graphics elements, comprising the steps of:

combining all groups of closely spaced quads into a polygon frame;

eliminating all frames from further potential table consideration that contain graphic decomposed lines oriented in other than vertical and horizontal;

25   replacing co-aligned lines, resulting from decomposition of graphics, with a single line;

recreating a table using decomposed replaced and unaltered lines to create cells; and

eliminating frames where textual quads are outside table created cells.

9.   A method of converting information in a visual display file using quads to a word processing software compatible type document, comprising the steps of:

combining all groups of quads spaced within a first predetermined distance of one another and comprising at least one of textual symbols and textual associated symbols into an expandable polygon frame;

combining all groups of quads in each frame that are spaced within a second predetermined distance, which second predetermined distance is less than said first predetermined distance, into words; and

converting each of the frames into a word processing type output document.

10.   A method of converting table related information, in a visual display source file using quads, to a spreadsheet importable type document, comprising the steps of:

combining all quads of the table related information in the visual display file into a frame;

oversizing all graphic quads in the frame;

decomposing all oversized graphic quads into straight lines;

creating a rectangle of substantially the same size as the table in the visual display document;

replacing co-aligned lines of said straight lines, resulting from decomposition of graphics, with a single line;

recreating a table using decomposed, replaced and unaltered lines to create cells;

inserting textual quads within created cells occupying substantially the same relative space in the created rectangle as it did in the table of the visually displayed source file; and

generating a mined document describing the composition of the created rectangle and the placement of text therein.

11.   A method of converting information in a range of visual display file textual matter, comprising multiple paragraphs of text, using quads into separate paragraphs of data in a mined document, comprising the steps of:

combining all groups of quads spaced within a first predetermined distance of one another and comprising at least one of textual symbols and textual associated symbols into an expandable polygon frame;

combining all groups of quads in each frame that are spaced within a second

5   predetermined distance, which second predetermined distance is less than said first predetermined distance, into words; and

converting each of the frames into a separate paragraph in a mined output document.

12.   Apparatus for extracting data from a source document wherein words, portions of words

10   and graphic elements are circumscribed by polygons, hereinafter referred to as quads, comprising:

means for oversizing each word and graphic quad in a selected range of the document;

means for assembling quads that overlap into frames;

means for decomposing all graphical elements within each frame into straight lines; and

15   means for assembling components of any frame into a table when examination of the decomposed elements in a frame indicates a predetermined arrangement of table cell defining straight lines.

13.   Apparatus as claimed in claim 12, comprising in addition:

means for retaining relative placement data of each decomposed line as obtained from the

20   source document;

means for combining any co-aligned straight lines after decomposition in a frame ascertained to comprise a table;

means for creating a rectangular table boundary in a frame ascertained to comprise a

25   table;

means for splitting any previously formed rectangle determined to be cut by any selected co-aligned line inserted into said rectangular table boundary to create at least two new rectangles; and

means for generating a mined document from which data may be displayed.

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14.   Apparatus for mining data from a visually displayable source document having quads defining textual and graphics elements, comprising:

means for combining quads, having less than a predetermined separation, into frames;

means for generating textual paragraphs, in an output document, from frames detected to
5   contain only textual and textual associated symbols; and

means for generating tables, in said output document, from frames detected to contain only vertically and horizontally oriented straight lines enclosing textual symbols.

15.   Apparatus for eliminating a group of quads in a source document, each quad of which is
10   relatively situated within a predetermined distance of each other, as potentially defining a table of data, comprising:

means for decomposing all graphic elements in said group of quads into straight lines;

means for determining the orientation of each of said straight lines; and

means for eliminating said group of quads where any of said straight lines is oriented
15   other than horizontal and vertical.

16.   Apparatus for establishing that a group of quads in a source document, each of which is relatively situated within a predetermined distance of each other, potentially defines a table of data, comprising:

means for decomposing all graphic elements in said group of quads into straight lines;
20   and

means for determining that the orientation of each of said straight lines is either horizontal or vertical.

25   17.   Apparatus as claimed in claim 16, comprising in addition:

means for combining any decomposed co-aligned lines into a new set of straight lines;

means for creating a rectangular table perimeter;

means for cutting said rectangular table perimeter into smaller rectangles using said straight lines whereby a plurality of cells are created; and

30   means for eliminating said group of quads as a potential table if any text quad is not circumscribed by a rectangular cell.

18.   Apparatus for recreating a table in a destination document from a visual display file using quads to encompass textual and graphics elements, comprising:

means for combining all groups of closely spaced quads into a polygon frame;

means for eliminating all frames from further potential table consideration that contain

5   graphic decomposed lines oriented in other than vertical and horizontal;

means for replacing any set of co-aligned lines, resulting from decomposition of graphics, with a single line;

means for recreating a table using decomposed replaced and unaltered lines to create cells; and

10   means for eliminating frames as table candidates where textual quads are outside table created cells.

19.   Apparatus for converting information in a visual display file using quads to a word processing software compatible type document, comprising:

15   means for combining all groups of quads spaced within a first predetermined distance of one another and comprising at least one of textual symbols and textual associated symbols into an expandable polygon frame;

means for combining all groups of quads in each frame that are spaced within a second predetermined distance, which second predetermined distance is less than said first

20   predetermined distance, into words; and

means for converting each of the frames into a word processing type output document.

20.   Apparatus for converting table related information, in a visual display source file using quads, to a spreadsheet importable type document, comprising:

25   means for combining all quads of the table related information in the visual display file into a frame;

means for oversizing all graphic quads in the frame;

means for decomposing all oversized graphic quads into straight lines;

means for creating a rectangle of substantially the same size as the table in the visual

30   display document;

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means for replacing co-aligned lines of said straight lines, resulting from decomposition of graphics, with a single line;

means for recreating a table using decomposed, replaced and unaltered lines to create cells;

5   means for inserting textual quads within created cells occupying the same relative space in the created rectangle as it did in the table of the visually displayed source file; and

means for generating a mined document describing the composition of the created rectangle and the placement of text therein.

10   21.   Apparatus for converting information in a range of visual display file textual matter, comprising multiple paragraphs of text, using quads into separate paragraphs of data in a mined document, comprising:

means for combining all groups of quads spaced within a first predetermined distance of one another and comprising at least one of textual symbols and textual associated symbols into 15   an expandable polygon frame;

means for combining all groups of quads in each frame that are spaced within a second predetermined distance, which second predetermined distance is less than said first predetermined distance, into words; and

.   means for converting each of the frames into a separate paragraph in a mined output 20   document.

22.   A method of recreating a table in a destination document from a visual display source file using quads to encompass textual and graphics elements, comprising the steps of:

replacing, in a frame, co-aligned lines, resulting from decomposition of graphics, with a 25   single line;

recreating a table using decomposed replaced and unaltered lines to create cells;

inserting textual quads into cells corresponding to the table location of the textual quad in the source file; and

eliminating rectangles of substantially less than the size of the smallest cell containing a 30   textual quad.

23.   A method of positioning textual quads in a column of cells at least some of which contain multiple columns of data in a single column of cells, comprising the steps of:

checking every cell of a source document derived table frame for cells having segregated sets of textual symbol quads;

5   assigning virtual cut-lines to textual quads that are aligned with textual quads in prior similar size cells in a given column; and

using the virtual cut-lines in aligning textual matter in an output document.

24.   Apparatus for recreating a table in a destination document from a visual display source

10   file using quads to encompass textual and graphics elements, comprising:

means for replacing, in a frame, co-aligned lines, resulting from decomposition of graphics, with a single line;

means for recreating a table using decomposed replaced and unaltered lines to create cells;

15   means for inserting textual quads into cells corresponding to the table location of the textual quad in the source file; and

means for eliminating rectangles of substantially less than the size of the smallest cell containing a textual quad.

20   25.   Apparatus for positioning textual quads in a column of cells at least some of which contain multiple columns of data in a single column of cells, comprising:

means for checking every cell of a source document derived table frame for cells having segregated sets of textual symbol quads;

means for assigning virtual cut-lines to textual quads that are aligned with textual quads

25   in prior similar size cells in a given column; and

means for using the virtual cut-lines in visually aligning textual matter in an output document.